1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

EPA is submitting this Report to Congress in compliance with section 431(b) of the Department of Veterans Affairs and Housing and Urban Development and Independent Agencies Appropriations Act of 2000, Public Law No. 106-74 (1999) ("Appropriations Act"). The Appropriations Act directs EPA to conduct an evaluation of the Phase I Storm Water Program as follows:

> No later than 120 days after the enactment of this Act, the Environmental Protection Agency shall submit to the Environment and Public Works Committee of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report containing a detailed explanation of the impact, if any, that the Phase I program has had in improving water quality in the United States (including a description of specific measures that have been successful and those that have been unsuccessful).

In response to the mandate of the Appropriations Act, this Report answers the following questions:

- Has the Phase I program contributed to efforts under the Clean Water Act (CWA) to improve the quality of the Nation's waters?
- Which specific components of the Phase I program have been successful? Which have been unsuccessful? What lessons can be learned to further improve the program's effectiveness?

1.2 ENVIRONMENTAL IMPACTS OF STORM WATER

Over the years, significant research has documented the actual and potential adverse impacts of storm water runoff. As rainfall or snowmelt moves over and through the earth's surface, naturally occurring and man-made pollutants can be transported to rivers, streams, lakes, and coastal waters. Once present in a water body, these pollutants can impair aquatic life or adversely affect human health (through consumption of contaminated water or contaminated aquatic life).

The potential for adverse impacts from storm water runoff increases as natural vegetation is altered by development activities (removal of vegetative cover and construction of impervious structures such as buildings, roads and highways, parking lots, and sidewalks). The potential for adverse impacts increases in urbanized areas, where the cumulative effect of development can result in significant changes to natural drainage patterns, thereby increasing peak flows in urban streams and wetlands. Increased peak flows can result in stream bank erosion, flooding, channelization, and alteration (or elimination) of habitat.

1.2.1 Early Efforts to Document Storm Water Impacts

Since the late 1970s a variety of research projects have evaluated the impacts of storm water discharges on water quality, including several national storm water assessments supported by EPA. Perhaps the most comprehensive study designed to provide a better understanding of the nature of urban runoff from commercial and residential areas was the Nationwide Urban Runoff Program (NURP).

> The NURP study provided EPA insights on what could be considered background levels of pollutants in urban storm water runoff. In addition, the study indicated that urban runoff can be adversely affected by several sources of pollutants that were not directly evaluated in the study, including illicit storm sewer connections, construction site runoff, industrial site runoff, and illegal dumping.

The NURP program, executed between 1978 and 1983, assessed storm water contamination at 28 locations across the Nation. Although the program was conducted at the local level, the objectives, methods, and assessments represented a single, coordinated effort. The primary objective of NURP was to develop information to assist local decision makers, States, EPA, and others in determining whether urban storm water runoff is causing water quality problems and whether management practices could be used to alleviate those problems (USEPA, 1983). A major aspect of NURP was the collection of samples to characterize the quality of urban storm water. Most of the samples collected in the study were analyzed for conventional pollutants, nutrients, and metals.

Several findings from NURP addressed the potential impacts on water quality:

- Metals were the most prevalent priority pollutants found in urban runoff, and the concentrations for the metals were generally found to exceed freshwater aquatic life criteria.
- Pathogens (e.g., coliform bacteria) were present in high concentrations and exceeded EPA's water quality criteria during and immediately after storm events in most rivers and streams.
- Nutrients were found at concentrations that might accelerate eutrophication problems and limit recreational uses.
- Total suspended solids (TSS) concentrations were high as compared to concentrations from municipal wastewater receiving secondary treatment (reported at concentrations at least an order of magnitude greater than those found after secondary treatment).
- Concentrations of oxygen-demanding substances were found to be comparable to concentrations in municipal wastewater receiving secondary treatment.
- Physical aspects related to urban runoff, such as erosion and scour, can significantly affect a receiving water's fish population and associated habitat.

A limited number of samples were taken at each site during the NURP study to monitor for 120 priority pollutants in storm water discharges from lands used for residential, commercial, and light industrial activities. The results from this monitoring showed the detection of 77 priority

pollutants, including 14 inorganic and 63 organic pollutants. The concentrations in many of the samples exceeded various freshwater water quality criteria.

The NURP study provides insight on what can be considered background levels of pollutants for urban runoff because the study focused primarily on monitoring runoff from residential, commercial and light industrial areas. Based in part on the NURP study findings, many other studies have been conducted by EPA, States, academia, associations, and others to further characterize and report on the potential impacts of storm water from a variety of sources (urban and nonurban) on receiving water quality. EPA summarized much of the research performed on storm water impacts in the publication *Environmental Impacts of Stormwater Discharges: A National Profile* (USEPA, 1992a).

In 1985, the States conducted a more comprehensive study of diffuse pollution sources under the sponsorship of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and EPA. The study resulted in the report *America's Clean Water–The States Nonpoint Source Assessment, 1985* (ASIWPCA, 1985), which indicated that 38 States had reported urban runoff as a major cause of beneficial use impairment. In addition, 21 States had reported construction site runoff as a major cause of use impairment.

1.2.2 Recent National Summary of Storm Water Discharge Impacts

Section 305(b) of the CWA requires each State to conduct water quality surveys to determine a water body's overall health, including whether designated uses are being met. States, tribes, and other jurisdictions define appropriate uses for a water body and incorporate these uses into water quality standards approved by EPA. Common water body use categories include public water supply, fish and wildlife propagation, recreation (swimming, boating, fishing, etc.), agricultural, industrial, and navigation. States and other jurisdictions conduct water quality surveys and report the findings to EPA every two years. EPA then prepares a biennial report to Congress, which represents the most complete and up-to-date snapshot of water quality conditions around the country.

The most recent report in this series, *The National Water Quality Inventory: 1996 Report to Congress* (USEPA, 1998), provides a general assessment of water quality based on State reports. The report indicates the fraction of the States' waters assessed, as well as the fraction of the States' waters fully supporting their designated uses. The report also enumerates impaired waters, defined as those waters that fail to meet designated use protection criteria. As shown in Table 1-1, the States reported that urban runoff/storm sewer discharges affect 13 percent of impaired rivers and streams, 21 percent of impaired lakes, 10 percent of impaired Great Lake shoreline, 55 percent of impaired ocean shoreline, and 46 percent of impaired estuaries.

Table 1-1. Summary of Water Body Use Impairment Attributable to Urban Runoff/Storm Sewer Discharges

Water Body Type	Percent of Total Waters Surveyed	Percent of Surveyed Waters Found Impaired	Percent of Impaired Waters Impacted by Urban Runoff/Storm Sewers
River and Streams	19	36	13
Lakes	40	39	21
Great Lakes Shoreline	94	97	4
Ocean Shoreline	6	13	55
Estuaries	72	28	46

Source: USEPA, 1998.

The 305(b) reports do not allow for a detailed ranking of all subcategories of storm water discharges, most notably storm water associated with industrial activities. However, several categories included in 305(b) reports provide some indication as to the potential for storm water from industrial activities to contribute to water quality impairment. These categories are industrial point source, land disposal, construction, and resource extraction. A summary of the reported impact of these categories on water body impairment is provided in Table 1-2.

Table 1-2. Summary of Water Body Use Impairment Attributable to Storm Water Associated with Industrial Activity Discharges[a]

Water Body Type	Percent of Total Waters Surveyed	Percent of Surveyed Waters Found Impaired	Percent of Impaired Waters Impacted by Industrial Point Sources[b]	Percent of Impaired Waters Impacted by Land Disposal	Percent of Impaired Waters Impacted by Construction[c]	Percent of Impaired Waters Impacted by Resource Extraction
River and Streams	19	36	9	7	9	13
Lakes	40	39	9	11	11	5
Great Lakes Shoreline	94	97	9	9	1	0
Ocean Shoreline	6	13	29	27	17	5
Estuaries	72	28	65	19	11	16

[a] The categories of sources include discharges of process wastewater as well as storm water discharges. Therefore, the percentages of impairment indicated in the table likely overstate the actual impact attributable to storm water discharges.
[b] Includes Construction and Land Development categories.
[c] Includes Industrial, Petroleum Activities, and Other Point Source categories.
Source: USEPA, 1998.

1.3 STORM WATER PROGRAM HISTORY

The primary objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. This objective is supported by two national goals: to eliminate all pollutant discharges to navigable waters by 1985, and to achieve fishable and swimmable waters by 1983 wherever attainable. To achieve the objective and goals, the CWA established a variety of programs to control the discharge of pollutants to receiving waters. Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) permit program to specifically control the discharge of pollutants from point source dischargers.

Considering increases in economic activity and population, significant progress in controlling pollution from point sources has been made, particularly with regard to industrial process wastewater and municipal sewage. Expenditures by EPA, States, and local governments to construct and upgrade sewage treatment facilities have substantially increased the population served by higher levels of treatment and have significantly reduced pollutant loadings to the

Nation's waters. Continued improvements are expected for these discharges as the NPDES program continues to place increasing emphasis on water quality-based pollution controls, especially for toxic pollutants.

The appropriate means of regulating storm water point source discharges under the NPDES permit program has been a matter of serious concern since 1972. In 1973, EPA promulgated the first storm water regulations, exempting from permit requirements storm water runoff not contaminated by industrial or commercial activity. EPA justified this exemption by citing the overwhelming administrative burden associated with issuance of individual permits for storm water point sources, as well as the fact that storm water discharges were not well suited to the traditional, technology-based controls that formed the basis of the NPDES permit program.

As a result of the Agency's rulemaking, the Natural Resources Defense Council (NRDC) brought suit against EPA, challenging the Agency's authority to selectively exempt point sources from NPDES permit requirements [*NRDC* v. *Train*, 396 F. Supp. 1393. (D.D.C. 1975), aff'd; *NRDC* v. *Costle*, 568 F.2d 1369 (D.C. Cir. 1977)]. The Court agreed and held that EPA could not exempt point source dischargers from regulation under the NPDES permit program.[1] As a result of the settlement agreement, EPA promulgated a final storm water rule in 1984 that established two classes of storm water dischargers:

- Group I: Storm water discharges that are required to apply for an NPDES permit.
- Group II: Storm water discharges that are required only to notify EPA or authorized States that a storm water discharge has occurred.

In 1987, the 1984 storm water regulations were challenged on the basis that too many storm water point sources remained unregulated. As a result, the U.S. Court of Appeals remanded the final storm water regulations.

Subsequently, Congress added section 402(p) to the Water Quality Act of 1987 (WQA) to provide a comprehensive framework for EPA to address storm water point source discharges. Section 402(p) specifically requires the development and implementation of regulations to control storm water discharges in two phases. Phase I was intended to control storm water discharges that pose the greatest threat to water quality. The scope of Phase II was to be determined based on the nature and extent of storm water discharges not regulated under the Phase I program.

Under the Phase I program, EPA or NPDES authorized States could not require an NPDES permit for certain storm water discharges until October 1, 1992, except for storm water

[1]It should be noted that the Court also was convinced that the flexibility in the NPDES permit program would make permit issuance for storm water discharges manageable. Later, upon review, the Court of Appeals noted that it might be appropriate for EPA, under certain circumstances, to use area or general permits as a practical way to regulate storm water discharges [568 F.2d 1369, 1679 (1977)].

discharges listed under section 402(p)(2). Section 402(p)(2) lists five types of storm water discharges required to obtain a permit prior to October 1, 1992:

- A discharge for which a permit was issued prior to February 4, 1987.
- A discharge associated with industrial activity.
- A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.
- A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.
- A discharge that the Administrator or the State, as the case may be, determines contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States.

Section 402(p)(4)(A) required EPA to promulgate, no later than two years after the date of enactment, final Phase I regulations governing storm water permit application requirements for storm water discharges associated with industrial activity and discharges from large municipal separate storm sewer systems (systems serving a population of 250,000 or more). Section 402(p)(4)(B) also required EPA, no later than four years after enactment, to promulgate final regulations governing storm water permit application requirements for medium separate storm sewer systems (systems serving a population of 100,000 or more but less than 250,000). In addition, section 402(p)(4) provides that permit applications for storm water discharges associated with industrial activity and discharges from large municipal separate storm sewer systems "shall be filed no later than three years" after the date of enactment of the WQA (no later than February 1990).

For Phase II, section 402(p)(5) of the WQA directed EPA, in consultation with the States, to study additional storm water discharges not addressed by the Phase I program. Section 402(p)(5) specifically required a study for the purpose of

- Identifying those storm water discharges or classes of discharges for which permits are not already required as part of the first phase of the NPDES storm water program.
- Determining, to the maximum extent practicable, the nature and extent of pollutants in such discharges.
- Establishing procedures and methods to control storm water discharges to the extent necessary to mitigate impacts on water quality.

Section 402(p)(6) of the WQA provides for EPA to issue regulations that designate additional storm water discharges to be controlled to protect water quality under Phase II of the program and to establish a comprehensive program to regulate such designated sources.[2]

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[2]On December 8, 1999, EPA promulgated regulations related to the Phase II storm water program (64 FR 68722). The Phase II program addresses storm water discharges from small municipal separate storm sewer systems (MS4s) serving less than 100,000 persons and construction sites that disturb 1 to 5 acres.

1.4 PHASE I PROGRAM STATUS

EPA promulgated final regulations for Phase I storm water discharges on November 16, 1990 (55 FR 47990). The regulations identified the scope of the Phase I storm water program by defining the three major classes of storm water discharges that would be required to obtain an NPDES permit for storm water discharges. These classes include storm water discharges associated with industrial activity, which include discharges from construction activities disturbing 5 acres or more of total land area, and discharges from municipal separate storm sewer systems (MS4s) serving populations of 100,000 or more (medium and large MS4s).

Since the promulgation of the Phase I storm water regulations, EPA and authorized States have been involved in a variety of efforts to implement the program (e.g., issuing NPDES permits). The particular permit options available to the regulated entities are at the discretion of the NPDES permitting authority. Operators of regulated industrial activity (including construction activities) have two options — an individual permit or a general permit. Operators of medium and large MS4s, however, usually can obtain coverage only under an individual permit. The various types of storm water permits are briefly described below.

1.4.1 Municipal

A municipal separate storm sewer system (MS4) is defined as any conveyance or system of conveyances that is owned or operated by a State or local government entity and is designed for collecting and conveying storm water (and which is not part of a publicly owned treatment works (POTW) or a combined sewer). The November 1990 regulations specifically identified 220 municipalities whose MS4s are subject to Phase I of the NPDES program.[3] These medium and large MS4s were required to submit two-part applications that identify a variety of site-specific pollution prevention measures, source controls, and best management practices (BMPs) to control pollutants from targeted sources within the municipality. Based on the two-part applications, which were to be submitted by 1993, EPA and authorized States have been issuing NPDES permits that reflect the management measures to be used by the MS4s to control storm water discharges.

The Phase I regulations allow EPA and authorized States the discretion to require MS4s not listed in the regulation to apply for an NPDES permit.[4] Based on this discretion, the universe of MS4s

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[3]As described in more detail in Chapter 3, the 1990 list of medium- and large-sized MS4s was amended in conjunction with the promulgation of the Phase II regulations.

[4]According to 40 CFR 122.26(a)(v), this discretion is provided for storm water discharges which either the State Director or EPA Regional Administrator determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This designation

affected by the Phase I program has increased. Since the issuance of the Phase I regulations in 1990, the number of affected MS4s has grown to more than 1,000. Most of the additional MS4s are small cities that are co-permitted with a neighboring Phase I MS4. A detailed discussion of the status of the Phase I permits is included in Chapter 3 and Appendix A.

1.4.2 Industrial

EPA initially estimated that about 100,000 facilities would have storm water discharges associated with industrial activities and would require coverage under an NPDES permit. EPA acknowledged in its final rule that this large number of facilities would place a correspondingly large administrative burden on EPA and authorized States to issue NPDES permits. As part of the final Phase I rule, EPA introduced a strategy to address this permitting task that provided flexibility in the manner in which NPDES permits are issued. The strategy included a tiered approach to issuing permits for storm water discharges associated with industrial activity. This tiered approach included initial baseline permitting using general permits to cover the majority of affected facilities, followed by more targeted permitting, including the use of facility-specific NPDES permits, to address storm water discharges with a greater likelihood of causing impacts on water quality.

To implement EPA's permitting strategy, the November 16, 1990, Phase I storm water regulations provided two permit application options for storm water associated with industrial activity:

- Submit an individual application.
- Participate in a group application for facilities that have similar industrial operations, waste streams, and other characteristics.

Subsequent revisions to the regulations provided a third option: file a notice of intent (NOI) to be covered under a general permit.

Under the second option, the deadline for submission of group applications was September 30, 1991. EPA received more than 1,200 group applications covering approximately 60,000 industrial facilities with storm water discharges (USEPA, 1995).

EPA provided industries the option of participating in a group application in lieu of submitting applications for individual NPDES permits. The deadline for submission of group applications was September 30, 1991. EPA received more than 1,200 group applications covering approximately 60,000 industrial facilities with storm water discharges (USEPA, 1995).

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may include a discharge from any conveyance or system of conveyances used for collecting and conveying storm water runoff or a system of discharges from municipal separate storm sewers.

EPA issued a baseline general permit on September 9, 1992 (57 FR 41176) for storm water discharges associated with industrial activity (excluding construction activity). This permit was intended to cover most of the storm water discharges associated with industrial activity in all States not authorized to issue NPDES permits (including 12 States and six territories). In addition, EPA intended the baseline general permit to serve as a template for general permits to be issued by authorized States.[5] The baseline general permit established a variety of conditions and requirements for storm water discharges, the most significant of which was the requirement to develop and implement a site-specific storm water pollution prevention plan (SWPPP). The purpose of the SWPPP is to prevent, reduce, and/or control the storm water pollutant sources.

Based on extensive review and analysis of information contained in the group applications, EPA developed a multi-sector general permit (MSGP) that contains requirements for 30 different industrial sectors (excluding construction activity). The MSGP was issued on September 29, 1995 (60 FR 50804). On September 30, 1998 (63 FR 52430), EPA published a modification to the MSGP, which expanded permit coverage to industries previously covered by the baseline general permit (which had expired) and previously ineligible for MSGP coverage. The MSGP is the only NPDES storm water general permit currently available to operators of industrial facilities located in areas where EPA is the NPDES permitting authority.

1.4.3 Construction

The Phase I program defines "storm water discharge associated with industrial activity" to include storm water discharges from construction activities (including grading, clearing, excavation, or other earthmoving activities) that result in the disturbance of 5 or more acres of total land area, including areas that are part of a larger common plan of development or sale (see 40 CFR 122.26(b)(14)(x)). EPA's strategy for issuing NPDES permits for storm water discharges from construction activities is similar to its strategy for storm water discharges associated with industrial activities; that is, initially issue general permits to cover most discharges, to be followed by targeted issuance of site-specific individual permits as necessary.

Consistent with its tiered strategy, EPA issued a baseline general permit on September 9, 1992 (57 FR 44412) that specifically addressed storm water discharges associated with construction activity. This baseline general permit was intended to cover most of the storm water discharges associated with construction activity in all States not authorized to issue NPDES permits. Based on data and information collected from this initial baseline general permit, as well as experience

[5]Initially, only 17 out of 39 States authorized to administer the NPDES permit program were also approved to issue general NPDES permits. As of September 1998, all 43 States with NPDES permit program authorization are also authorized to issue general NPDES permits. Like EPA, authorized states have primarily relied on the use of general permits to provide permit coverage for discharges of storm water from industrial facilities.

gained from implementing the general permit, EPA revised and reissued the general permit on February 14, 1998 (63 FR 7898).[6]

EPA intended the baseline construction general permit to serve as a template for general permits to be issued by authorized States. The baseline general permit for construction activities establishes a variety of conditions and requirements for storm water discharges from construction sites, the most significant of which is the requirement to develop and implement a site-specific SWPPP that specifies erosion and sediment controls that will be used at the site.

1.5 ORGANIZATION OF REPORT

This Report to Congress is organized as follows:

- **Chapter 2** summarizes the methodology used to respond to Congress's request.
- **Chapter 3** presents EPA's evaluation of the Phase I storm water program for municipal separate storm sewer systems.
- **Chapter 4** presents EPA's evaluation of the Phase I storm water program for construction activities.
- **Chapter 5** presents EPA's evaluation of the Phase I storm water program for industrial activities.

[6]EPA Regions 4 and 6 reissued separate construction general permits (63 FR 15622, March 31, 1998, and 63 FR 36490, July 6, 1998, respectively) that apply only in areas where the EPA region is the NPDES permitting authority.